FMOS051N02-H

List

FMOS051N02-H

5.1A 20V N-Channel Enhancement Mode MOSFET

Features

- V_{DS} = 20V, I_D = 5.1A.
- $R_{DS(ON)}$ ≤ 25mΩ, @V_{GS} = 4.5V, I_D = 1.5A.
- $R_{DS(ON)}$ ≤ 33mΩ, @V_{GS} = 2.5V, I_D = 1.5A.
- Fast switching speed.
- Reliable and rugged.
- Lead-free parts meet RoHS requirements.

Applications

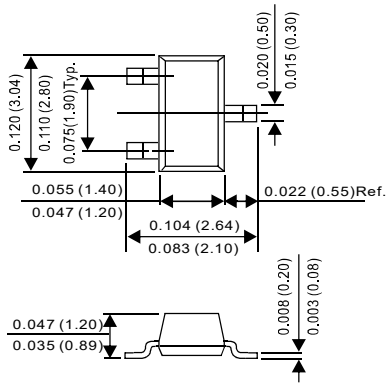
- Portable equipment.
- Battery powered system.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Mounting Position : Any.

Package outline

SOT-23



Dimensions in inches and (millimeters)

Maximum ratings (T_J=25°C unless otherwise noted)

Parameter		Symbol	Ratings	Unit
Drain-source voltage		V_{DS}	20	V
Gate-source voltage		V_{GS}	±12	V
Continuous drain current	(T_A=25°C)	I_D	5.1	A
	(T_A=70°C)		4.0	A
Pulsed drain current (Note 1)	(T_A=25°C)	I_{DM}	12.6	A
Avalanche current, Single pulse (Note 2)	(L=0.1mH)	I_{AS}	14	A
Avalanche current, Single pulse (Note 2)	(L=0.1mH)	E_{AS}	9.8	mJ
Power dissipation	(T_A=25°C)	P_D	1.0	W
	(T_A=70°C)		0.6	
Junction temperature		T_J	+150	°C
Storage temperature range		T_{STG}	-55 to +150	°C
Thermal resistance form junction to ambient (Note3)	(t≤10s)	$R_{\theta JA}$	90	°C/W
	(Steady state)		125	

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Electrical characteristics (At T_J=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	20			V
Drain-source leakage current	I_{DSS}	V_{DS}=16V, V_{GS}=0V			1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±12V, V_{DS}=0V			±100	nA
On characteristics						
Gate threshold voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	0.4	0.65	0.9	V
Static drain-source on-resistance (Note4)	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=1.5A		21	25	mΩ
		V_{GS}=2.5V, I_D=1.5A		25	33	
Forward Transconductance	g_{FS}	V_{GS}=10V, I_D=1.5A		4.7		S
Dynamic Parameters						
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=10V, f=1.0MHz		427		pF
Output capacitance	C_{oss}			61		
Reverse transfer capacitance	C_{rss}			53		
Gate resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		2		Ω
Switching parameters						
Total gate charge	Q_g	V_{GS}=4.5V, V_{DS}=10V, I_D=6A		8.6		nC
Gate to source charge	Q_{gs}			0.7		
Gate to Drain charge	Q_{gd}			3.2		
Turn-on delay time	$t_{d(on)}$	V_{DS}=10V, V_{GS}=4.5V, I_D=1A R_G=6Ω		4		ns
Rise time	t_r			14		
Turn-off delay time	$t_{d(off)}$			26		
Fall time	t_f			7.6		
Source-drain diode ratings and characteristics						
Drain - source diode forward voltage (Note 4)	V_{SD}	V_{DS}=0V, I_{SD}=1A		0.75	1.1	V
Body diode reverse recovery time	t_{rr}	V_{DS} = 10V, I_F= 6.0A, di/dt = 100A/μs		18		ns
Body diode reverse recovery charge	Q_{rr}			5.5		nC

Note : 1. Maximum current is limited by junction temperature.
2. UIS tested and pulsed width are limited by maximum junction temperature 150℃.
3. Surface mounted on 1in^2 FR-4 board with 1oz.
4. Pulse test (Pulse width ≤ 300μs, Duty cycle ≤ 2%).
5. Guaranteed by design, not subject to production testing.

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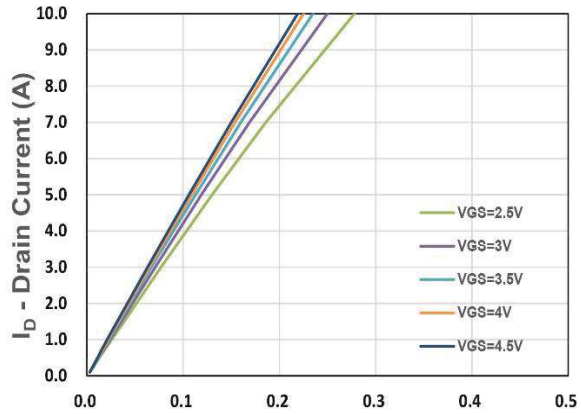
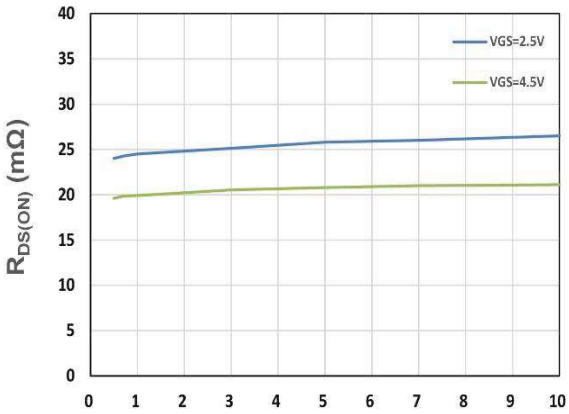
Rating and characteristic curves



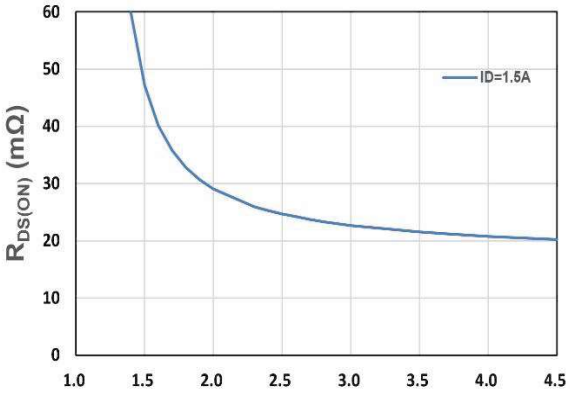
V_{DS} - Drain - Source Voltage (V)

Figure 1. Output Characteristics



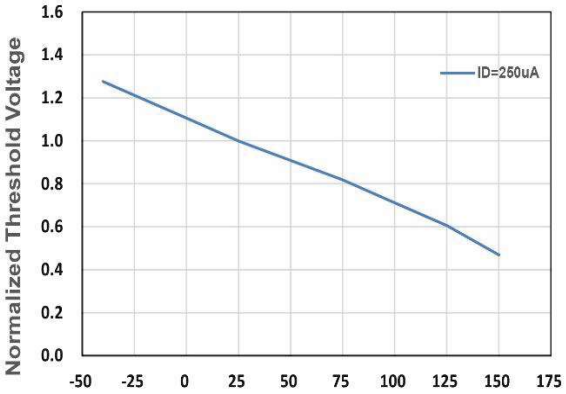
I_D- Drain Current (A)

Figure 2. On-Resistance vs. ID



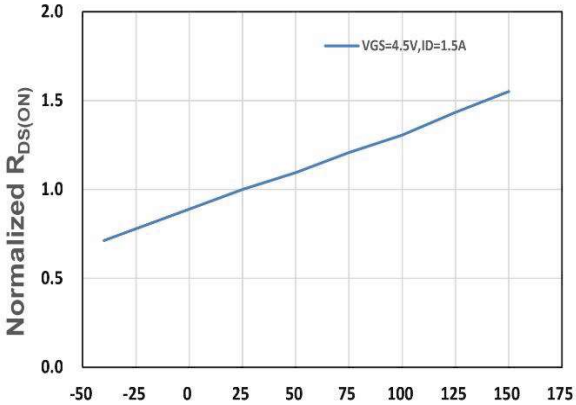
V_{GS} - Gate - Source Voltage (V)

Figure 3. On-Resistance vs. VGS



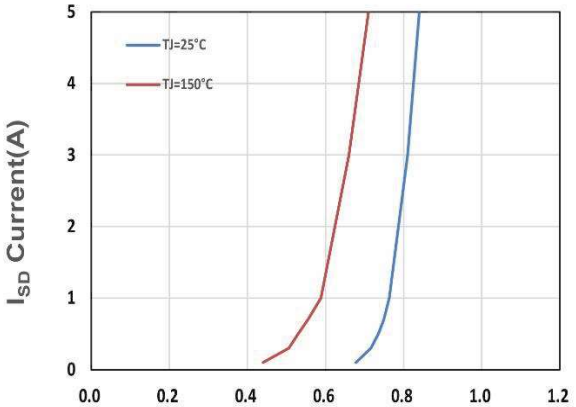
Tj, Junction Temperature(°C)

Figure 4. Gate Threshold Voltage



Tj , Junction Temperature(°C)

Figure 5. Drain-Source On Resistance



V_{SD}, Source-Drain Voltage(V)

Figure 6. Source-Drain Diode Forward

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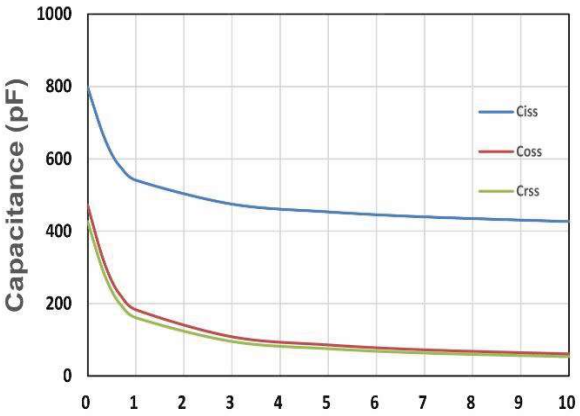
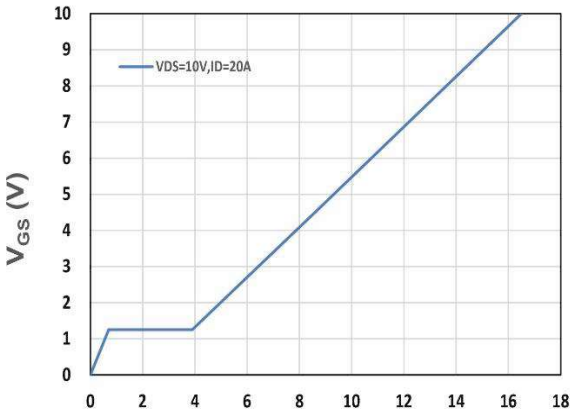
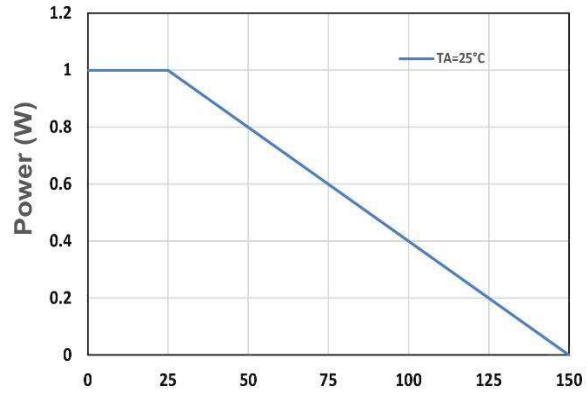
Rating and characteristic curves



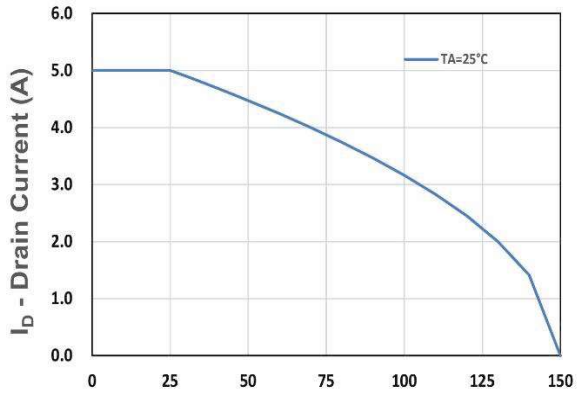
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



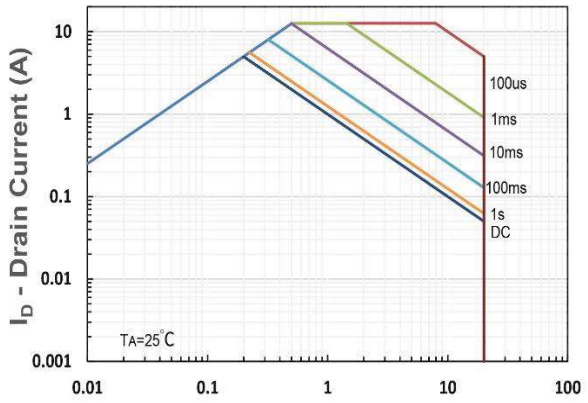
Qg, Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



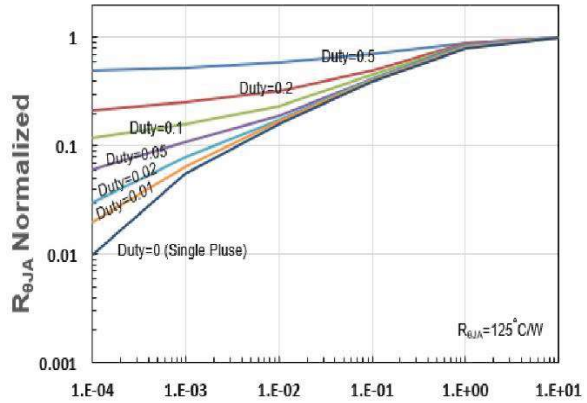
Tj - Junction Temperature (°C)
Figure 9. Power Dissipation



Tj - Junction Temperature (°C)
Figure 10. Drain Current



V_{DS} - Drain-Source Voltage (V)
Figure 11. Safe Operating Area



t_1,Square Wave Pulse Duration(s)
Figure 12. RθJA Transient Thermal Impedance

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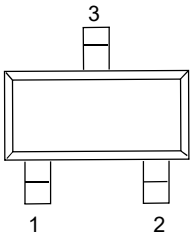
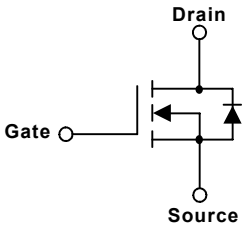
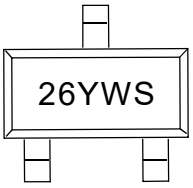
Pinning information

Pin	Simplified outline	Symbol
Pin 1 Gate Pin 2 Source Pin 3 Drain		

Marking

Type number	Marking code
FMOS051N02-H	

*26: Product code.
YWS: Wafer lot code.
Y: Year.
W: Week.
S: Sequence

Suggested solder pad layout

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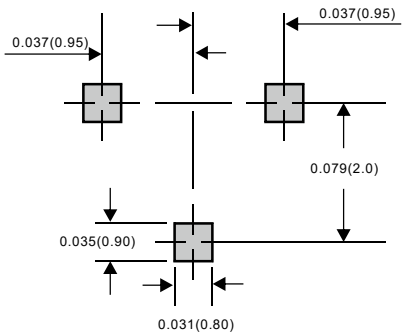

Dimensions in inches and (millimeters)

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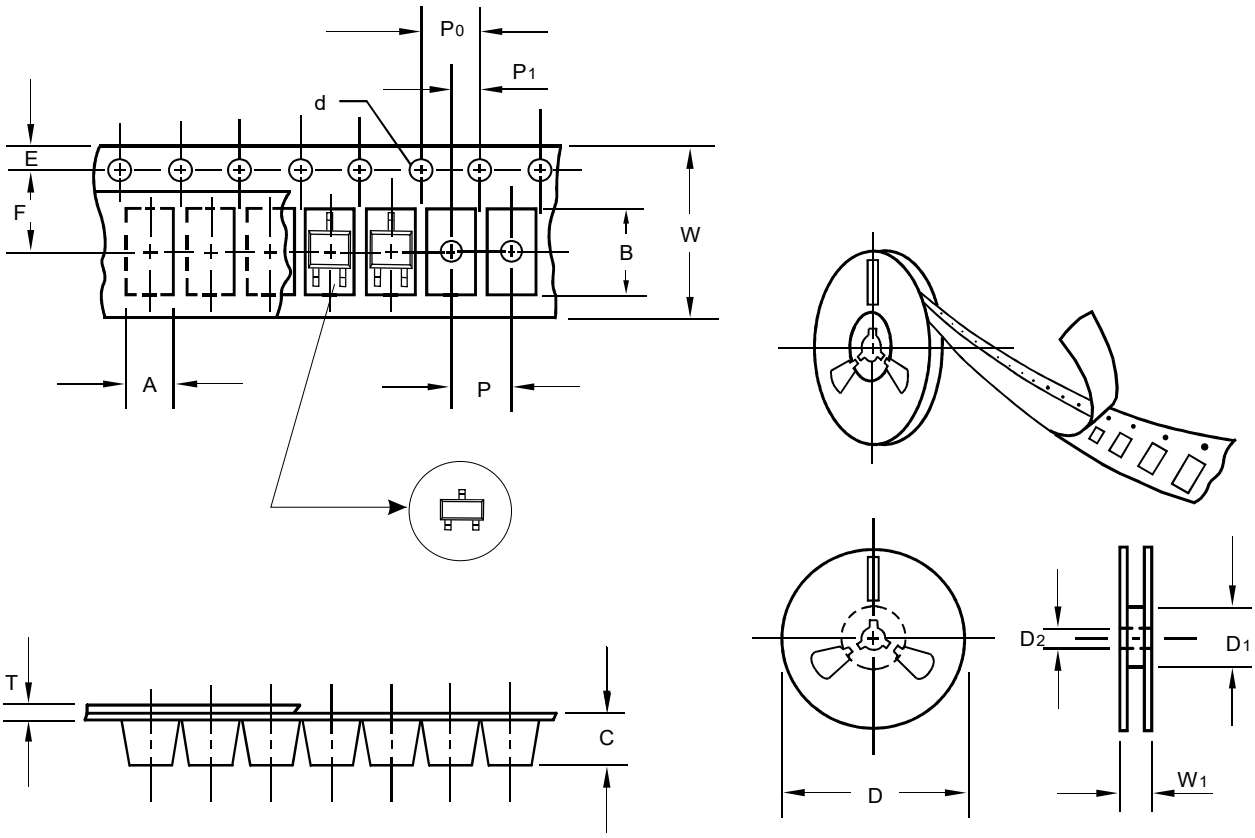
Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	54.40
Feed hole diameter	D_2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P_0	0.1	4.00
Embossment center	P_1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W_1	1.0	11.40

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

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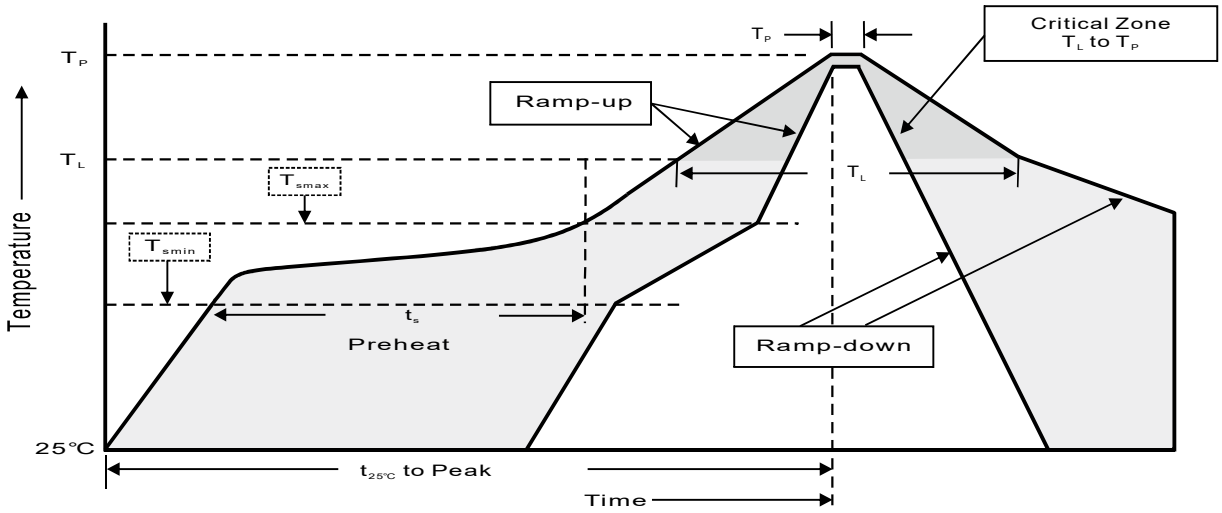
Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6

Suggested thermal profiles for soldering processes

1.Storage environment: Temperature = 5°C ~ 40°C Humidity = 55%, ±25%
2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile feature	Soldering condition
Average ramp-up rate (T_L to T_P)	< 3 ℃/sec
Preheat - Temperature Min (T_{smin}) - Temperature Max (T_{smax}) - Time (Min to Max) (t_s)	 150℃ 200℃ 60 ~ 120 sec
T_{smax} to T_L - Ramp-up rate	 < 3 ℃/sec
Time maintained above : - Temperature (T_L) - Time (T_L)	 217℃ 60 ~ 260 sec
Peak temperature (T_P)	255 ℃ -0/+5℃
Time with 5℃ of actual peak temperature (T_P)	10 ~30 sec
Ramp-down rate	< 6 ℃/sec
Time 25℃ to peak temperature	< 6 minutes